MICHIGAN

FOREST PEST DETECTION PROGRAM

REPORT FOR 1955

●

COMPILED BY

FORESTRY DIVISION,
MICHIGAN DEPARTMENT OF CONSERVATION

●

COOPERATORS

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UNITED STATES FOREST SERVICE

PRIVATE FOREST INDUSTRY

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INTRODUCTION

The Michigan Forest Pest Detection Program was organized in the spring of 1950 through the efforts of several state and federal agencies. Each agency cooperating in the program contributes in its respective field to the problem of forest insects and diseases on a state-wide basis.

Using a system of permanent observation areas (See Map I), information on forest pests is obtained throughout the state, with particular emphasis on certain "critical" insects. In this way, pest population levels are closely followed, providing valuable data for forest protection.

The Fifth Annual Lake States Forest Insect Survey Conference was held in Minneapolis in February. Representatives of federal, state and private agencies participated. One of the chief problems confronting this group is the standardization and coordination of survey techniques and activities in Minnesota, Wisconsin and Michigan.

Close coordination between corresponding agencies in the Great Lakes region has been possible through the formation of the Central International Forest Insect and Disease Conference. At this conference, entomologists, pathologists and foresters from the three Lake States and adjoining Canadian Provinces are able to discuss mutual forest pest problems and present research findings. The third meeting of this conference was held in November at Lansing, Michigan.

The following report of the activities of the Michigan Forest Pest Detection Program during 1955 was prepared by the Forestry Division of the Michigan Conservation Department.

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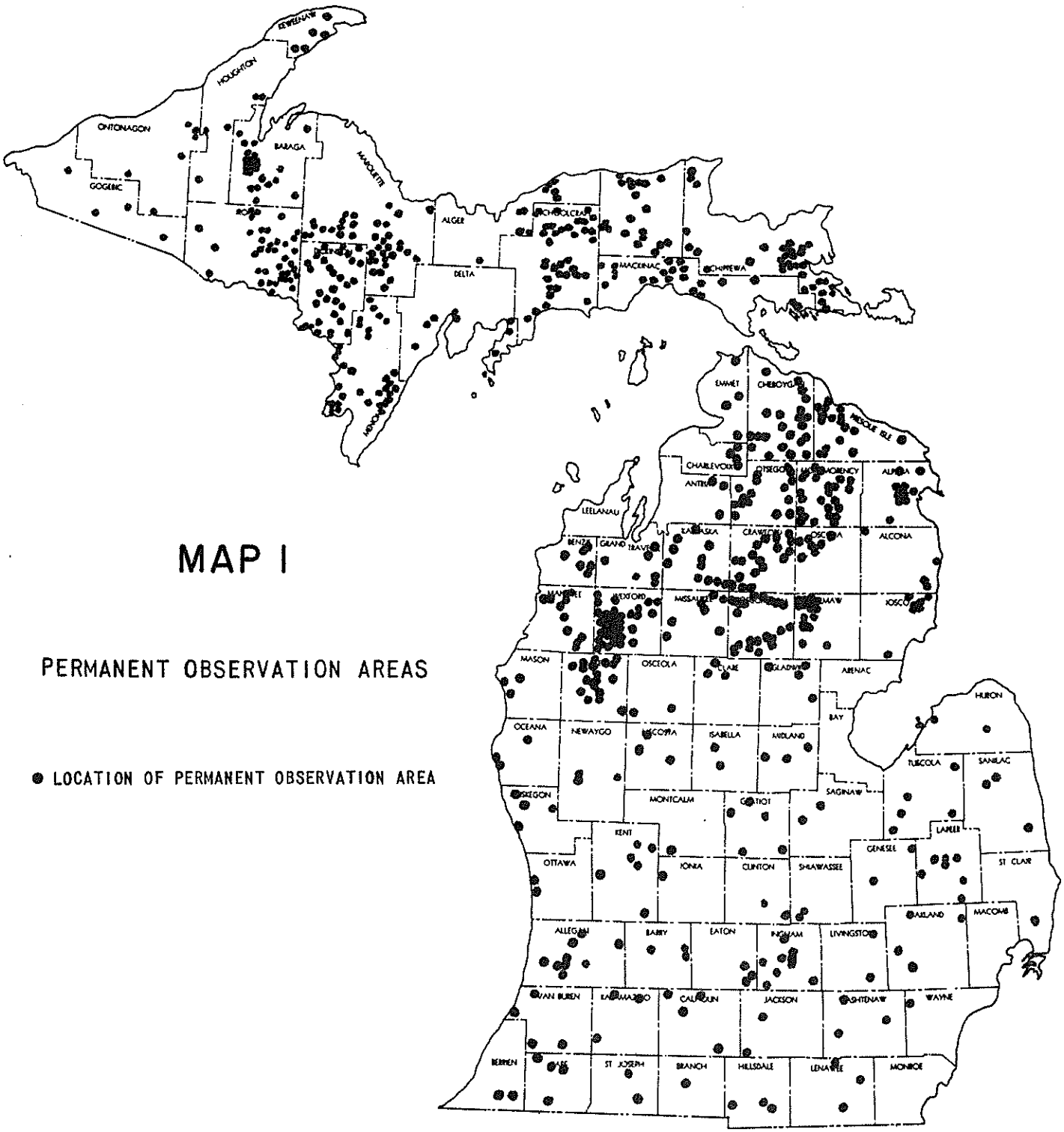


MAP I

PERMANENT OBSERVATION AREAS

● LOCATION OF PERMANENT OBSERVATION AREA

FOREST INDUSTRY COOPERATION

Forest industry has shown a continually increasing interest in forest insects and diseases, and has expressed this interest by actively participating in the pest detection program. Industry foresters report on permanent insect observation areas and assist with special surveys.

The following companies, including four pulp and paper companies, four mining companies and two power companies are now actively participating in the forest insect detection program:

Calumet and Hecla
Cleveland Cliffs Iron Company
Consolidated Water Power and Paper Company
Consumers Power Company
Copper Range Company
Escanaba Paper Company
Kimberly-Clark of Michigan, Inc.
Marathon Corporation
Oliver Mining Company
Wisconsin-Michigan Power Company

* * *

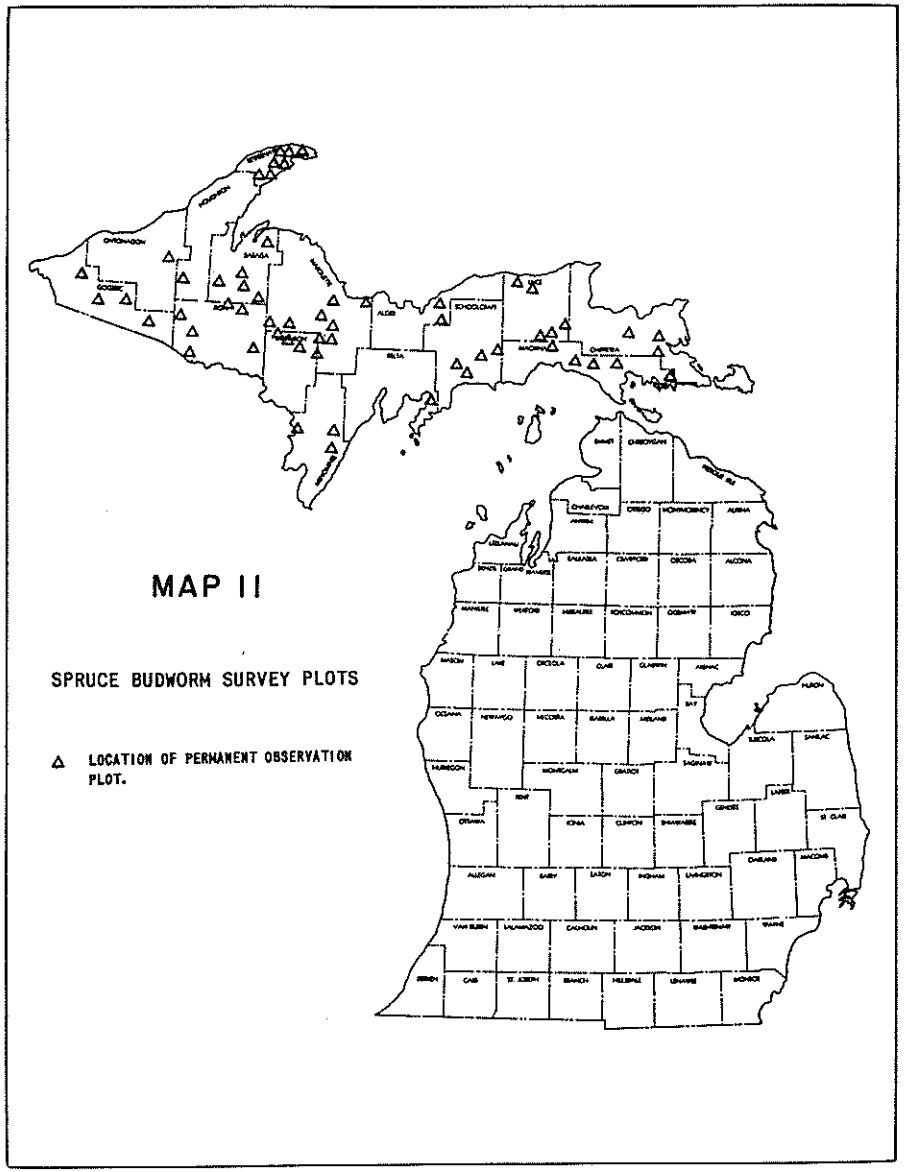
SPECIAL SURVEYS

SPRUCE BUDWORM

The spruce budworm was added to the list of critical insects in 1955 following the detection in 1954 of an outbreak in Keweenaw County. Surveys in 1954 showed heavy to complete defoliation on 2,500 acres of old-growth balsam and lighter infestations in other smaller areas of undetermined size. Logging operations, stepped up in an effort to control the insect, together with parasites and other causes, contributed to a decline of this infestation in 1955.

To determine the extent and severity of the budworm outbreak an intensive survey was set up in 1955 in the Upper Peninsula. Similar surveys were conducted in Minnesota and Wisconsin. The Lake States Forest Experiment Station will correlate the survey data for the three states and are studying population levels and the parasite complex. Training sessions for the survey were held on May 24 and 25 at Marquette and Newberry. About 60 state, federal and private foresters attended these meetings.

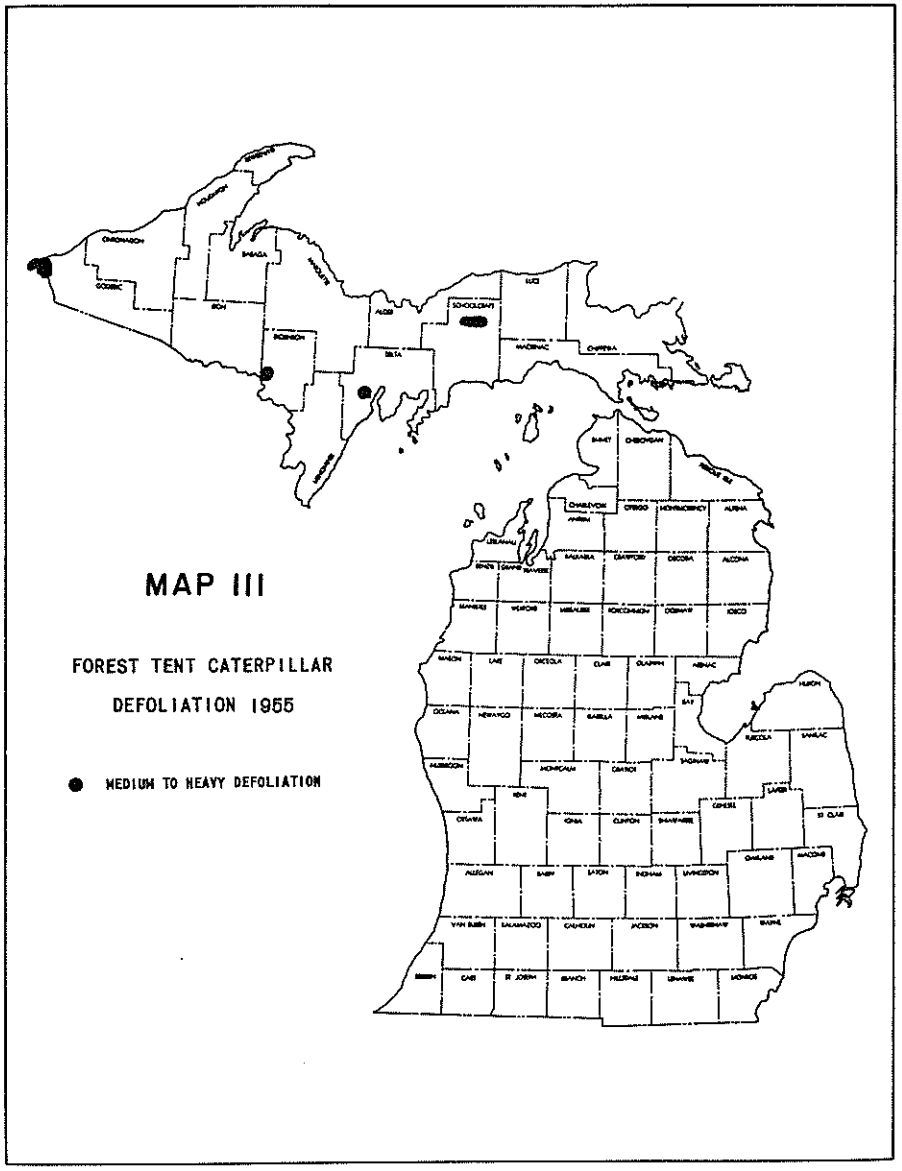
With the state district foresters acting as coordinators, 58 survey plots were established in the Upper Peninsula. Each plot consisted of three balsam trees from which the budworm larvae or pupae were collected by placing a sheet on the ground under the tree and sweeping the lower 10 feet of live crown with a pole. The resulting count is only an indication of the presence or absence of the insect and cannot be fully evaluated until records for several years are available. However, by sampling the same trees in successive years population trends may be noted.



MAP II

SPRUCE BUDWORM SURVEY PLOTS

△ LOCATION OF PERMANENT OBSERVATION PLOT.



MAP III

FOREST TENT CATERPILLAR

DEFOLIATION 1955

● MEDIUM TO HEAVY DEFOLIATION

Results of the survey are:

Total plots - 58 (see Map II)
Total positive reports - 12
Total number of larvae or pupae on parts of three trees sampled:

0 larva or pupa	46 reports
1 larva or pupa	7 reports
3 to 6 larvae or pupae	4 reports
14 larvae or pupae	1 report

Five of the positive reports were from Keweenaw County, four from Marquette County, two from Chippewa County and one from Mackinac County. Except for the reports from Keweenaw County, it is probable that the budworms found represent the normal endemic population.

RED-HEADED PINE SAWFLY

Following a report of mortality of jack pine killed by the red-headed pine sawfly in Leelanau County, a ground survey was conducted in this county and the surrounding area of Benzie, Grand Traverse, Wexford and Manistee counties to determine the extent of sawfly defoliation. Thirty-four red and jack pine plantations were inspected. Defoliation was found in some plantations in all the counties checked, but with the exception of the originally reported infestation only a few scattered colonies were found, indicating a very low population level.

In the SW¼ of the SE¼, Section 36, T 28 N, R 14 W, Leelanau County, which is the principal area of concern, 2% of the jack pine was killed by the sawfly and 16% was defoliated to some extent, in 1955. An egg survey will be made in 1956 and followed up by control measures if deemed advisable.

WHITE PINE WEEVIL

A survey for the white pine weevil was made in conjunction with the red-headed pine sawfly in Leelanau, Benzie, Manistee, Wexford and Grand Traverse counties. Eighteen jack pine plantations established in 1949 and 1950 were inspected and showed from 4% to 59% of the leaders killed, with an average of about 30% for all the plantations checked. Eleven 1951 and 1952 plantations averaged 6.5% weeviling with extremes of 0% to 21%.

RED PINE SAWFLY

On November 16, entomologists from the Lake States Forest Experiment Station made a survey of the red pine sawfly infestation in a 200-acre red pine plantation on the Cadillac Ranger District, Lower Michigan National Forest. Serious injury to date was found only on small, weak, suppressed trees growing under a fairly heavy hardwood overstory. Control will not be necessary in 1956 and an appraisal survey at that time will determine the status of the infestation and possible need for treatment in 1957. This insect only feeds on the old needles and is much less serious than the red-headed pine sawfly.

PINE TORTOISE SCALE

An aerial survey in July showed that the pine tortoise scale outbreak in Schoolcraft County had not enlarged much from the area attacked in 1954. The majority of the trees within the three-square-mile area were dead in 1954 and few additional trees died in 1955. This is a stand of open-grown natural jack pine of low commercial value.

An additional scale survey was made by the Lake States Forest Experiment Station on the Upper Michigan National Forest, on the Stonington Peninsula in Delta County. In the forest areas examined, no living scales were found. The characteristic sooty appearance was noted on trees of all sizes, but only the suppressed trees showed evidence of severe damage. The tops of the large trees are in good condition, and it appears the infestation has declined. Because of this decline, a control program in 1956 is not considered necessary.

FOREST TENT CATERPILLAR

On July 19, an aerial survey was made to map forest tent caterpillar defoliated areas in the Upper Peninsula. (See Map III). The defoliated area in Schoolcraft, Delta and Dickinson Counties remained about the same as in 1954, and in the other counties where the heavy outbreak had previously occurred very little defoliation was noted, as predicted in 1954. (Table I). The major exception to this was Gogebic County where 18,000 acres in the extreme west end were defoliated for the first time in 1955.

TABLE I

FOREST TENT CATERPILLAR DEFOLIATION - 1955

COUNTY	ACRES OF MEDIUM OR HEAVY DEFOLIATION
Delta	5,760
Dickinson	8,000
Gogebic	18,000
Schoolcraft	4,480
TOTAL	36,240

Total area defoliation figures by years are shown as follows:

1947-50	Undetermined
1951	690,000 acres
1952	1,133,000 acres
1953	1,468,000 acres
1954	292,770 acres
1955	36,240 acres

* * *

CONTROL PROJECTS

There were no control projects on state land in 1955. On private land, control was mainly directed towards the European pine shoot moth, white pine weevil, and sawflies in Christmas tree plantations. The U. S. Forest Service performed control operations for the Saratoga spittlebug and the European pine shoot moth. Data on these operations were received from the Lake States Forest Experiment Station.

On private land in Keweenaw County logging operations were speeded up to cut out an over-mature spruce-fir stand heavily infested with the spruce budworm. This is mentioned under "Special Surveys".

SARATOGA SPITTLEBUG

The U. S. Forest Service sprayed 1,570 acres of red pine plantations on the Ottawa National Forest and 357 acres of the Upper Michigan National Forest to control the Saratoga spittlebug. Post-spray checks indicated a very good degree of control. Adult sweep surveys in August showed that pre-control nymphal surveys will be necessary next spring on approximately 1,500 acres on the Ottawa National Forest.

EUROPEAN PINE SHOOT MOTH

On the Lower Michigan National Forest, trees very heavily infested by the European pine shoot moth on about 20 acres of red pine near Cadillac were cut and burned last April as a sanitation measure. This was designed to reduce the focal points of heavy infestation and enable the remaining lightly infested trees to reach a height where future infestation should do little damage.

* * *

OBSERVATION REPORTS

During the 1955 season, a total of 2,191 reports were received and analyzed by the Lansing office of the Conservation Department. This represents an increase of 124 reports over 1954.

The total number of permanent observation areas is now 760. The increase of 42 plots over the 1954 total is mainly due to the establishment of spruce budworm survey plots in the Upper Peninsula. There were 51 observation areas examined by private industry foresters, 38 by Forest Service personnel and one area by the Gogebic County forester. The remaining 669 areas were inspected by state foresters and are on the state forest lands, farm plantations and other private holdings.

* * *

CRITICAL INSECTS

The list of critical insects in Michigan may be changed from time to time to include actively or potentially injurious forest insects and to remove from the list those which are no longer considered thus. The detection of a spruce budworm outbreak in 1954 in the Upper Peninsula warranted the inclusion of this insect on the critical list in 1955. Absence of serious injury reports for either the larch casebearer or the pine spittlebug, and the apparent lack of potential injury by these insects, permits their removal from the critical insect list in 1956.

JACK PINE BUDWORM - *Choristoneura pinus* Free

Summary of Reports

	1951	1952	1953	1954	1955
Total.....	135	185	232	280	291
Percent Positive.....	38	40	32	20	20

Breakdown of 1955 Reports

Heavy defoliation (61-100%)..... 0.....(0.0%)
Medium defoliation (21-60%)..... 9.....(15.3%)
Light defoliation (1-20%).....50.....(84.7%)

The jack pine budworm population dropped to a moderate level in Lake and Grand Traverse counties in the Lower Peninsula, and Luce County in the Upper Peninsula. In addition, moderate defoliation was reported in Oscoda, Ogemaw, Crawford, Kalkaska and Chippewa counties. In Luce County, where an extensive outbreak has existed since 1952, the infestation continued to shift eastward into open-grown, orchard-type jack pine and the original outbreak area appears to be recovering satisfactorily. (See Map IV).

RED-HEADED PINE SAWFLY - *Neodiprion lecontei* (Fitch)

Summary of Reports

	1951	1952	1953	1954	1955
Total.....	133	173	231	230	260
Percent Positive.....	18	7	8	8	5

Breakdown of 1955 Reports

Heavy defoliation....(11-100% susceptible trees attacked).....2.....(16.7%)
Medium defoliation...(2-10% susceptible trees attacked).....3.....(25.0%)
Light defoliation....(0-1% susceptible trees attacked).....7.....(58.3%)

Reports show a continued decrease in population of this sawfly in 1955. Heavy defoliation was reported from Manistee, Emmet and Leelanau counties, and moderate defoliation from Alpena and Crawford counties, all in the Lower Peninsula. Mortality has occurred in Leelanau County and a detailed survey was made during the fall, 1955. This is reported under "Special Surveys". It is expected that some control operations will be made in 1956. (See Map V).

LARCH SAWFLY - *Pristiphora erichsonii* (Htg.)

Summary of Reports

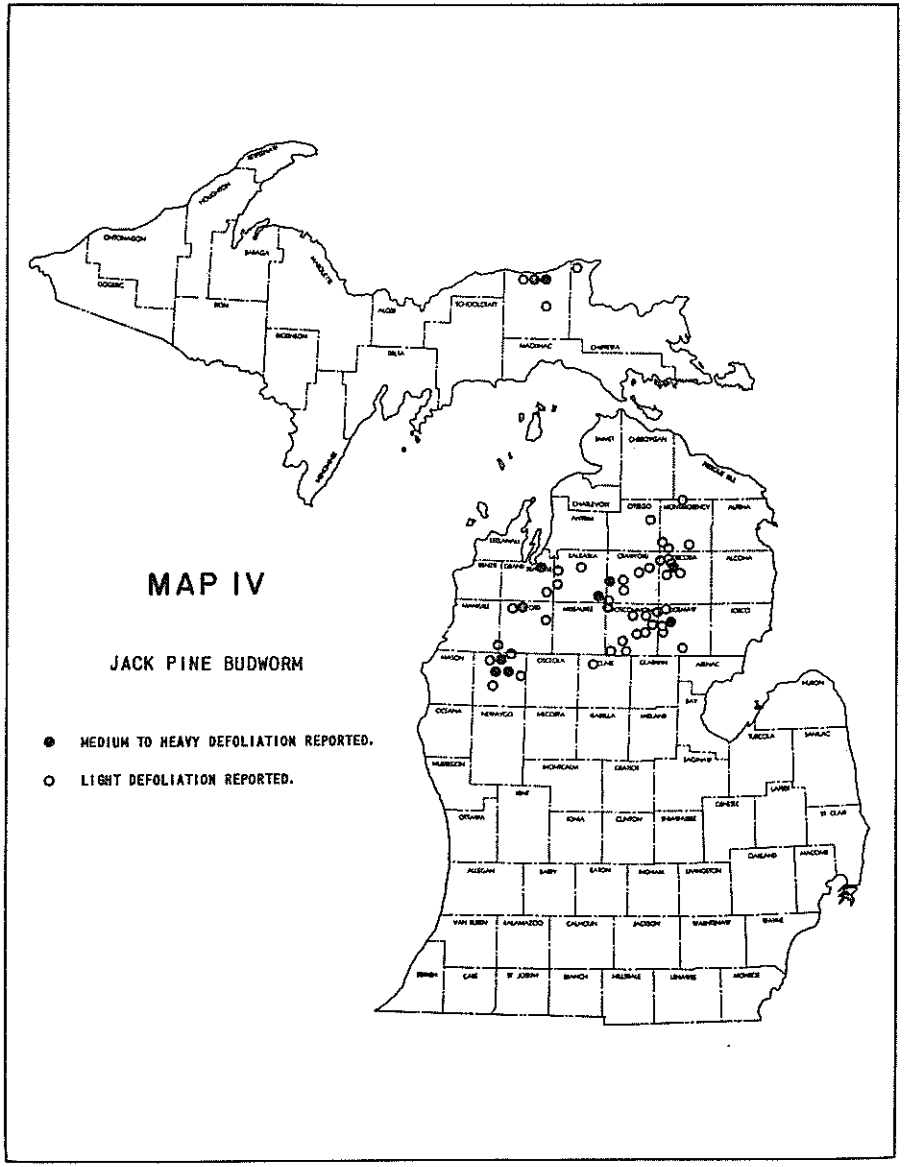
	1951	1952	1953	1954	1955
Total.....	68	113	137	135	145
Percent Positive.....	0	30 *	42	73 *	66

* THE APPARENT INCREASE IS LARGELY DUE TO INTENSIFIED SURVEYS RATHER THAN BUILDUP OF INSECT POPULATIONS.

Breakdown of 1955 Reports

Heavy defoliation.....(61-100%).....7.....(7.4%)
Medium defoliation.....(21-60%).....5.....(5.3%)
Light defoliation.....(1-20%).....83.....(87.3%)

Reports on the larch sawfly for the eastern Upper Peninsula and Lower Peninsula show about the same population as in 1954. Moderate defoliation occurred throughout most of Marquette, Iron and Dickinson counties. Baraga, Houghton and Gogebic counties suffered heavy defoliation, in many places 75% of the foliage being eaten. (See Map VI).

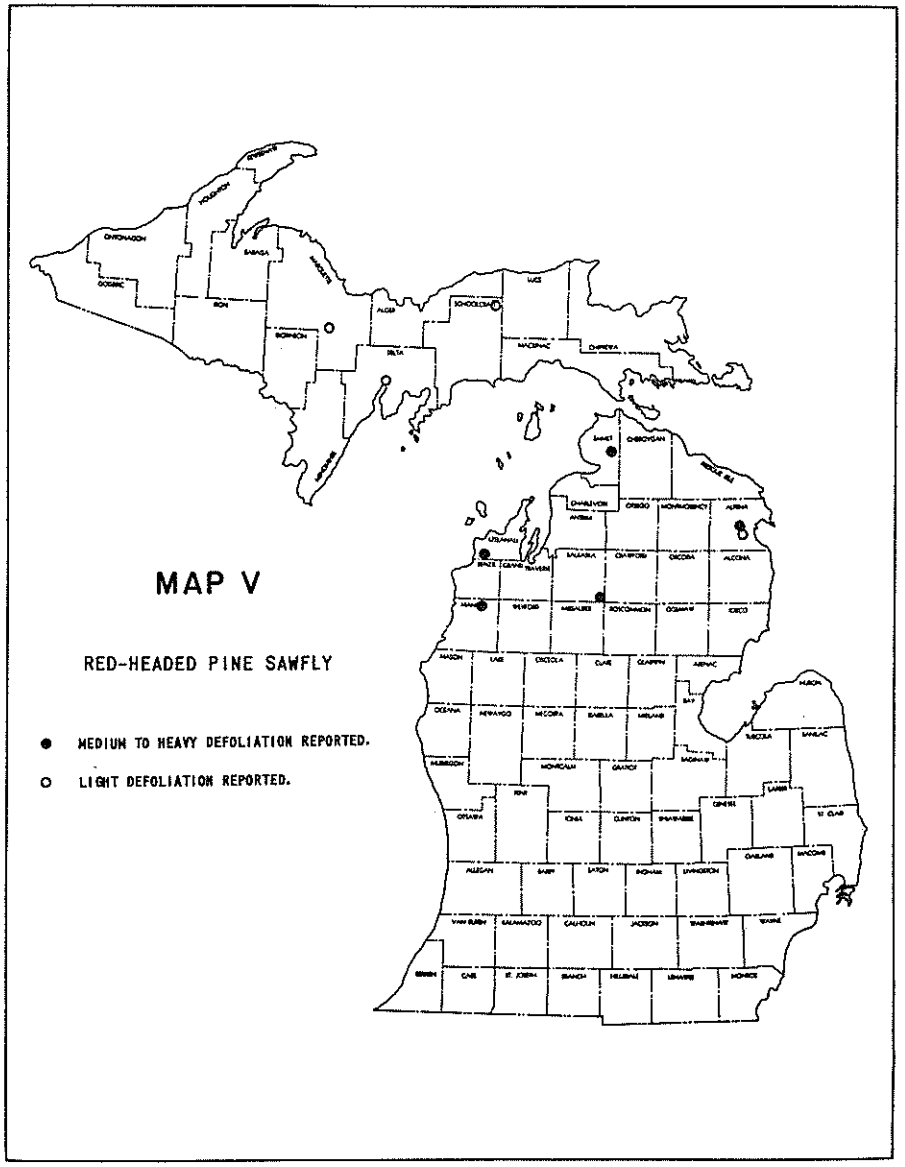


MAP IV

JACK PINE BUDWORM

● MEDIUM TO HEAVY DEFOLIATION REPORTED.

○ LIGHT DEFOLIATION REPORTED.



MAP V

RED-HEADED PINE SAWFLY

● MEDIUM TO HEAVY DEFOLIATION REPORTED.

○ LIGHT DEFOLIATION REPORTED.

SARATOGA SPITTLEBUG - *Aphrophora saratogensis* (Fitch)

Summary of Reports

	1951	1952	1953	1954	1955
Total.....	17	51	164	211	229
Percent Positive.....	88	27	34	23	28

Breakdown of 1955 Reports

Heavy injury.....(61-100%).....0.....(0.0%)
Medium injury.....(21-60%).....0.....(0.0%)
Light injury.....(1-20%).....65.....(100%)

Reports indicated a slight increase in the spread of the Saratoga spittlebug, but the absence of moderate or heavy injury reports indicates a general decline in the population.

WHITE PINE WEEVIL - *Pissodes strobi* (Peck)

Summary of Reports

	1951	1952	1953	1954	1955
Total.....	39	33	231	278	319
Percent Positive.....	82	64	65	59	60

Breakdown of 1955 Reports

Heavy injury.....(41-100% of leaders killed).....17.....(8.9%)
Medium injury.....(11-40% of leaders killed).....49.....(25.8%)
Light injury.....(1-10% of leaders killed).....124.....(65.3%)

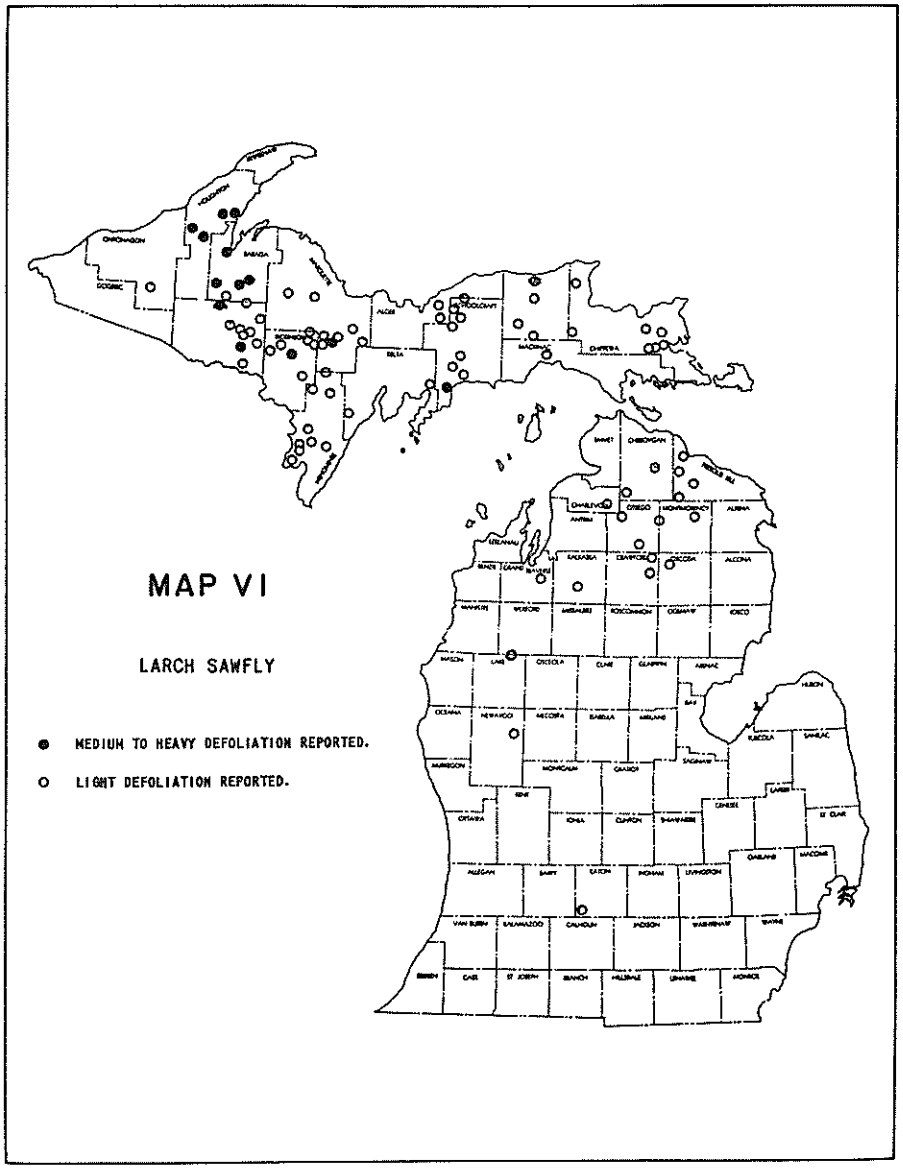
Terminal injury caused by the white pine weevil showed an increase over most of the state. Terminal killing of 40% or more of the white and jack pine on the observation areas was reported from Chippewa, Emmet, Presque Isle, Leelanau, Alpena, Crawford, Manistee, Wexford, Midland, Muskegon, Tuscola, Gratiot and Allegan counties.

Reports were received from Emmet, Roscommon and Allegan counties showing white pine weevil injury to red pine. There seems to be a general increase in weeviling on jack and red pine throughout the northern two-thirds of the Lower Peninsula.

ANOMALA BEETLE - *Pachystethus oblivia* (Horn)

Summary of Reports

	1951	1952	1953	1954	1955
Total.....	119	181	236	278	275
Percent Positive.....	35	36	32	38	38

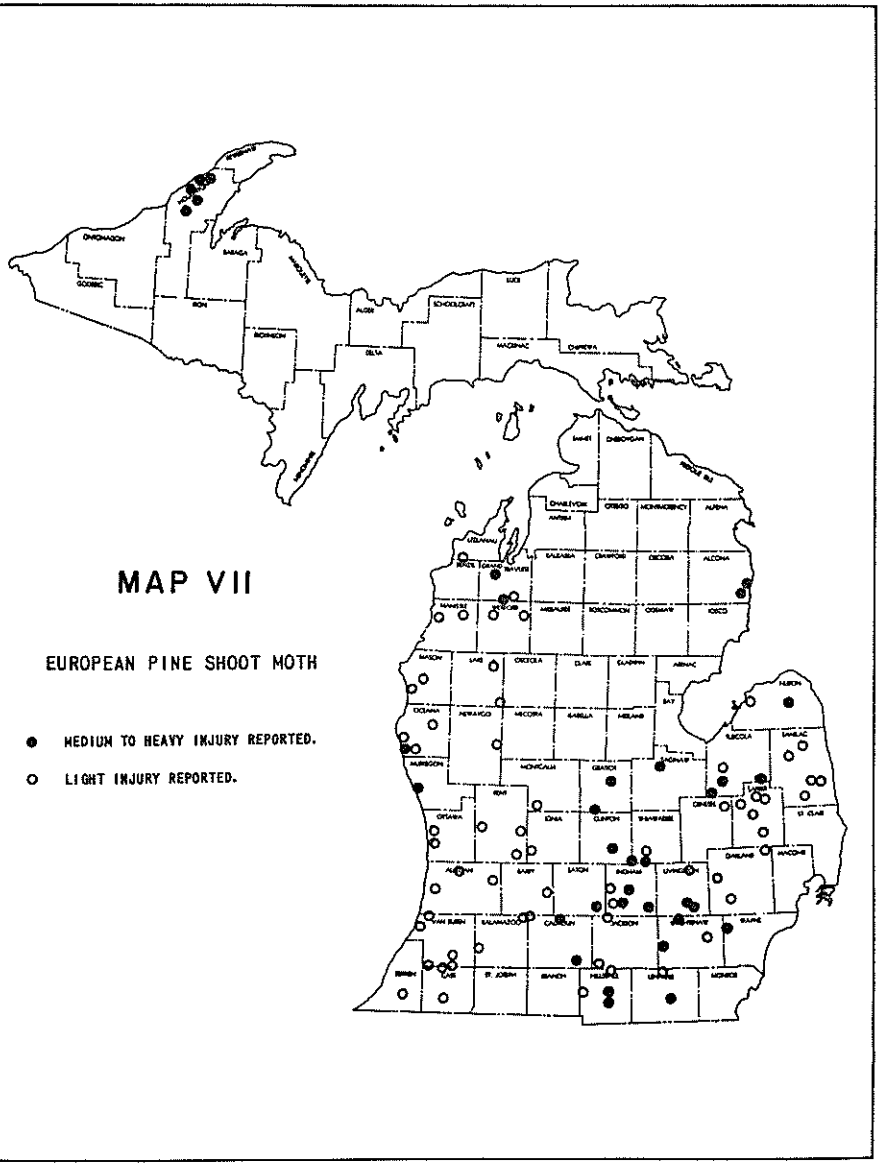


MAP VI

LARCH SAWFLY

● MEDIUM TO HEAVY DEFOLIATION REPORTED.

○ LIGHT DEFOLIATION REPORTED.



MAP VII

EUROPEAN PINE SHOOT MOTH

● MEDIUM TO HEAVY INJURY REPORTED.

○ LIGHT INJURY REPORTED.

Breakdown of 1955 Reports

Heavy defoliation.....(61-100%).....2.....(1.9%)
Medium defoliation.....(21-60%).....14.....(13.5%)
Light defoliation.....(1-20%).....88.....(84.6%)

Reports indicate a decline in anomala bettle population in 1955. Only two counties, Alcona and Manistee, reported heavy defoliation, compared to five counties in 1954. In addition, Cheboygan, Montmorency, Benzie, Iosco and Lake counties reported moderate defoliation. There have not been any reports of this insect from the Upper Peninsula.

LARCH CASEBEARER - *Coleophora laricella* (Hbn.)

Summary of Reports

	1951	1952	1953	1954	1955
Total.....	106	105	125	137	149
Percent Positive.....	94	96	79	69	47

Breakdown of 1955 Reports

Heavy defoliation.....(61-100%).....4.....(5.7%)
Medium defoliation.....(21-60%).....3.....(4.3%)
Light defoliation.....(1-20%).....63.....(90.0%)

Further decline in populations of this pest occurred in 1955. Many of the areas reporting light defoliation in 1954 indicated that only a trace of defoliation was present. Moderate or heavy defoliation occurred locally in Schoolcraft, Delta, Chippewa, Luce and Mackinac counties in the Upper Peninsula, and Kalkaska County in the Lower Peninsula.

EUROPEAN PINE SHOOT MOTH - *Rhyacionia bouliana* (Schiff.)

Summary of Reports

	1951	1952	1953	1954	1955
Total.....	44	80	119 *	203	207
Percent Positive.....	80	40	47	39	49

* INCREASE DUE TO INCLUSION OF INSECT ON CRITICAL LIST OF DISTRICTS IN NORTHERN HALF OF LOWER PENINSULA.

Breakdown of 1955 Reports

* Heavy injury.....29.....(28.4%)
* Medium injury.....4.....(3.9%)
* Light injury.....69.....(67.7%)

* Degree of injury = "I" = $\frac{\%\text{ of susceptible trees attacked} \times \%\text{ of tips infested}}{100}$

Heavy if "I" is greater than 20
Medium if "I" is between 10 and 20
Light if "I" is less than 10

With the exception of Grand Traverse, Alcona and Houghton counties, the reports of heavy and moderate damage came from the southern half of the Lower Peninsula, and particularly the southeastern part. The only known infestations in the Upper Peninsula are in roadside plantings in Houghton County along highways M-41 north of Houghton and M-26 south of Houghton, and in nearby pine plantations. A concerted control effort will be made in 1956 to eradicate this pest in this area. (See Map VII).

PINE SPITTLEBUG - *Aphrophora parallela* (Say)

Summary of Reports

	1954	1955
Total.....	73	77
Percent Positive.....	37	44

Breakdown of 1955 Reports

Heavy terminal injury.....(61-100%).....0.....(0.0%)
Medium terminal injury.....(21-60%).....1.....(3.0%)
Light terminal injury.....(1-20%).....33.....(97.0%)

Populations of the pest remained about the same as in 1954. Moderate injury was reported from Alpena County only.

EUROPEAN PINE SAWFLY - *Neodiprion sertifer* (Geoff.)

Summary of Reports

	1951	1952	1953	1954	1955
Total.....	31	64	85	82	111
Percent Positive....	87	69	74	75	74

Breakdown of 1955 Reports

* Heavy defoliation.....5.....(6.1%)
* Medium defoliation.....4.....(4.9%)
* Light defoliation.....73.....(89.0%)

* Degree of defoliation = "D" = $\frac{\%\text{ of susceptible trees attacked} \times \%\text{ of defoliation}}{100}$

Heavy if "D" is greater than 24
Medium if "D" is between 9 and 24
Light if "D" is less than 9

Reports indicate a slight increase in European pine sawfly population in the southern half of the Lower Peninsula. Heavy or moderate injury was reported from Kent, Barry and Kalamazoo counties in the southwestern Lower Peninsula, and Lapeer, Livingston, Washtenaw, Wayne and Hillsdale counties in the southeastern Lower Peninsula.

FOREST TENT CATERPILLAR - *Malacosoma disstria* Hbn.

Summary of Reports

	1954	1955
Total	117	120
Percent Positive	23	17

Breakdown of 1955 Reports

Heavy defoliation	(61-100%)	1	(5.0%)
Medium defoliation	(21-60%)	2	(10.0%)
Light defoliation	(1-20%)	17	(85.0%)

Defoliation by the forest tent caterpillar continued to decline in 1955 in the east end of the Upper Peninsula and the Lower Peninsula. A new outbreak developed in western Gogebic County where 18,000 acres were defoliated for the first time in recent years. Additional information is included under "Special Surveys".

SPRUCE BUDWORM - *Choristoneura fumiferana* (Clem.)

The spruce budworm was added to the critical insect list in 1955. See "Special Surveys" for details of this insect.

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OTHER IMPORTANT INSECTS

GYPSY MOTH- *Porthetria dispar* (L.)

On May 19, 1954, gypsy moth larvae were detected near the south city limits of Lansing, the first recent record of the insect west of eastern Pennsylvania. The Division of Plant Industry of the State Department of Agriculture immediately secured assistance from federal authorities in Washington and an intensive survey and spray program was set up under the direction of that department. The City of Lansing made immediate sprayings from the ground in the area of discovery. This was followed on June 6 to 10 by aerial spraying of 86,400 acres including the entire metropolitan area of Lansing and outlying areas. A total of 59,000 gallons of spray was applied at a cost for materials and application of $76,559.82.

Although only four male gypsy moths were found during the extensive trapping program in the summer of 1954, and only a few egg masses in the fall, a spray program was set up for 1955 by the State Department of Agriculture. This was begun on May 15 and finished May 22. A total of 12,500 acres was sprayed in a gross area of 36,000 acres, at a cost of $19,600.

Trapping again followed the spray program in the summer of 1955 with 3,708 traps placed in an area of 1,600,000 acres. Twnety-three traps collected a total of 32 moths, all outside the 1955 sprayed area. These positive trappings, coupled with egg mass collections, point to a need for spraying again in 1956.

PINE TORTOISE SCALE - *Toumeyella numismaticum* (Petit and McD.)

See "Special Surveys" for details of this insect.

WALKINGSTICK - *Diapheromera femorata* (Say)

This being an off-year for the walkingstick, no defoliation was noted except in Dickinson County. In this area there is a small defoliation that occurs in the odd years.

PINE NEEDLE MINER - prob. *Exoteleia pinifoliella* (Chamb.)

General yellowing of jack pine caused by a needle miner occurred in many areas, notably in Keweenaw and Cheboygan counties.

MITES

Serious buildups of red mites have followed Christmas tree spraying with DDT in Genesee County.

CHERRY SCALLOP SHELL MOTH - *Calocalpe undulata* (L.)

A widespread outbreak of this insect occurred again in 1955 over the northwestern part of the Lower Peninsula. Particularly heavy defoliation of the wild cherry occurred in Otsego County.

RED HUMPED CATERPILLAR - *Schizura concinna* (A. and S.)

Defoliation of 3,000 acres of hard maple by this insect was reported on Beaver Island, Charlevoix County.

RED PINE SAWFLY - *Neodiprion nonulus* Schedl.

See "Special Surveys" for details of this insect.

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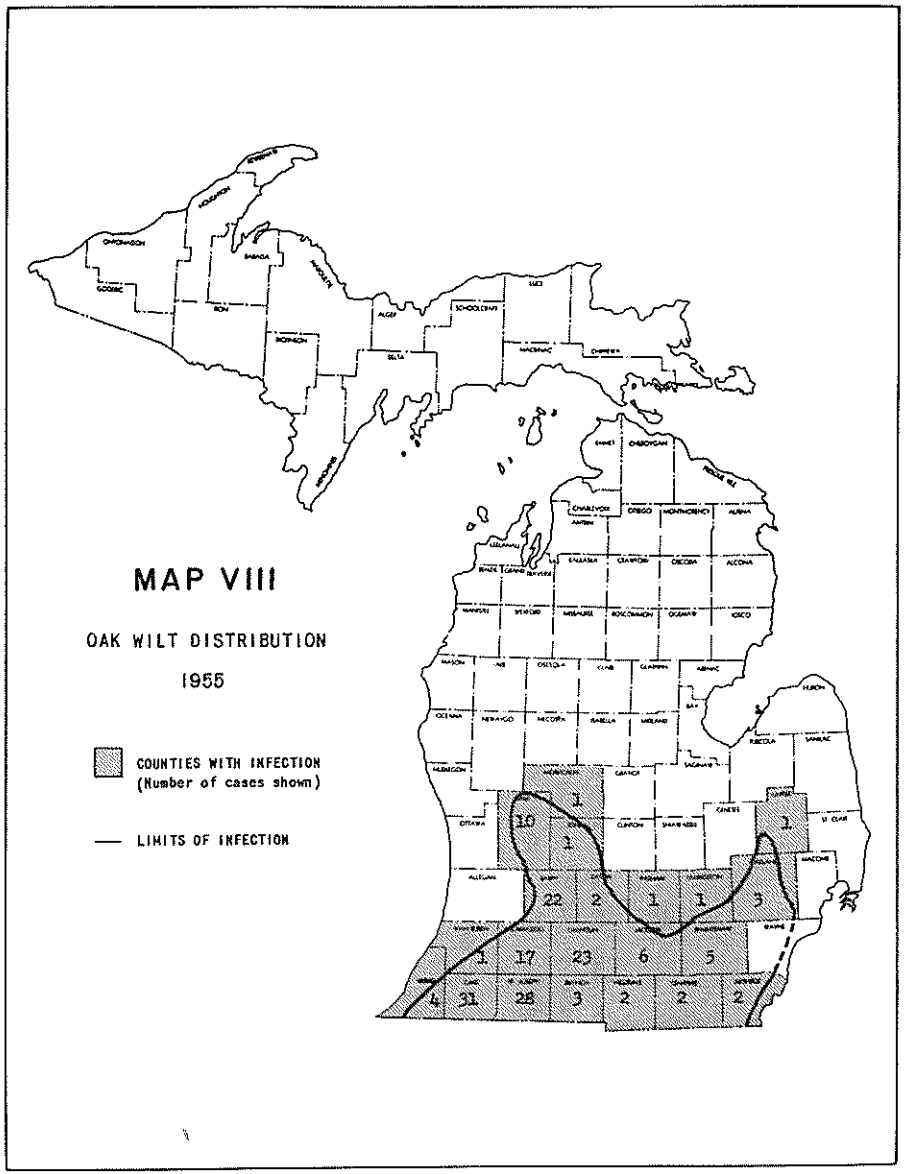
DISEASES

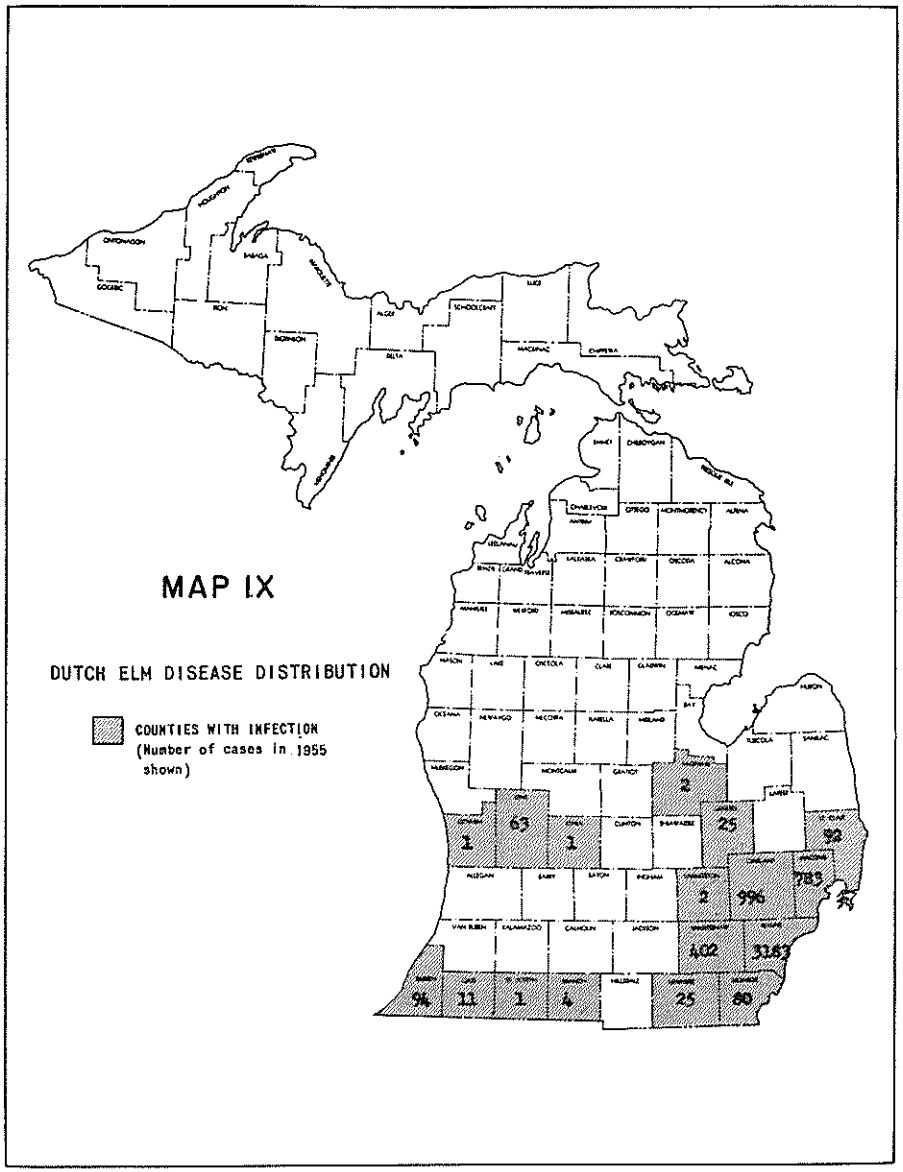
OAK WILT

Oak wilt disease was first confirmed in Michigan in 1951. Since that time annual aerial and ground surveys have found it in 21 southern Michigan counties, where indications often were that it had been present for a number of years.

Results of 1955 survey activities added only eight new oak wilt locations, all in counties having previous cases, bringing the total known spots of infection to 166. (See Map VIII). More would undoubtedly have been found this year had an intensive survey been conducted. However, general observations both from the air and on the ground indicated that the wilt was not spreading alarmingly. This fact lends new hope that the disease can be effectively controlled.

With the exception of two areas in which experimental control projects have been carried out, the aerial survey in 1955 was less intensive than in previous years. Two Conservation Department planes were used a total of 37 hours of flying time in the survey work, covering 1,042 miles of flight line, and flying over nearly all old known wilt locations. The cost of planes and pilots was $253.20.


MAP VIII
OAK WILT DISTRIBUTION
1955
COUNTIES WITH INFECTION
(Number of cases shown)
LIMITS OF INFECTION
1
10
1
1
22
2
1
1
3
1
17
23
6
5
4
31
28
3
2
2
2


MAP IX
DUTCH ELM DISEASE DISTRIBUTION
COUNTIES WITH INFECTION
(Number of cases in 1955
shown)
2
1
63
1
25
92
2
996
783
402
3183
94
11
1
4
25
80

Flights at two-mile intervals were made over experimental control areas in Kent and Barry counties; at four-mile intervals in parts of Kent and Montcalm counties; and at six-mile intervals in parts of Newaygo, Muskegon, Ottawa and Montcalm counties.

A total of 145 old locations was rechecked either by air or on the ground. Fifty of these showed currently wilting trees. Checking was done by both Conservation Department District Foresters and representatives of the State Department of Agriculture.

In the summer of 1954 an experimental control project was set up in Kent and Barry counties under the direction of the Department of Botany and Plant Pathology of Michigan State University. The project involved the removal by a contract cutter of all known infected trees within Kent County and the northwest quarter of Barry County. While results are as yet inconclusive, preliminary observations in 1955 indicated very little new incidence of disease in this entire experimental area.

The voluntary removal of infected trees was again encouraged in 1955, but, while most landowners were willing to cooperate, many were unable to do the job within the short time requested. It is believed that the time element is extremely important in oak wilt control. It is anticipated that a broader control program will be instituted in 1956.

DUTCH ELM DISEASE

Dutch elm disease was discovered in the Detroit area in 1950, and has since spread gradually into adjacent areas as far out as Lapeer, Genesee, Livingston and Lenawee counties, with additional spots located principally in southwestern Michigan and the cities of Saginaw, Coldwater and Grand Rapids. (See Map IX).

A cooperative program of survey and control is coordinated by the Division of Plant Industry of the State Department of Agriculture working with local units of government. This department is responsible for the survey and enforcement phase of the work, and the municipalities conduct the necessary sanitation and spraying. Laboratory facilities for diagnosing Dutch elm disease and oak wilt are maintained at Michigan State University.

The Division of Plant Industry reports that 194 communities were surveyed during 1955. Samples sent to the laboratory resulted in the positive diagnosis of 5,745 diseased trees. This is approximately the same as the number diagnosed in 1954, and represents the first year in which there has not been at least a three-fold increase over the preceding year.

WHITE PINE BLISTER RUST

A report of the white pine blister rust situation and control progress is prepared annually by the Area Leader for this cooperative federal-state project. The report for 1955 was not available in time to be summarized here.

DRY WEATHER

An extremely dry period accompanied by higher than average temperature in some parts of the state resulted in the death of many young natural and plantation trees.

Lake and Newaygo counties particularly seemed to be badly affected, with high mortality reported in two plantations. Light killing was observed in Presque Isle County. Undoubtedly similar killing occurred elsewhere and was not reported. Over 95% of a 100-acre six-year old jack pine plantation was killed in Section 8, T 20 N, R 12 W, Lake County, and 80% of a six-year old red pine-white pine plantation died in Section 24, T 13 N, R 11 W, Newaygo County. Mortality was not observed in older plantations in these areas in which the crowns had closed.

SUMMARY

State, private and federal foresters submitted, during the 1955 season, a total of 2,191 observation reports; an increase of 124 over the 1954 total. The total number of permanent observation areas is now 760.

Forest industry has shown a continually increasing interest in forest insects and diseases and is actively participating in the Pest Detection Program. Industrial foresters from 10 companies reported on 51 permanent observation areas.

Special surveys were made for six insects. The spruce budworm was added to the critical insect list in 1955, and 58 special observation plots were established to determine the extent and severity of the budworm population in the Upper Peninsula. Ground reconnaissance surveys were made in Leelanau, Benzie, Manistee, Wexford and Grand Traverse counties for the red-headed pine sawfly and white pine weevil. An aerial survey was made to map forest tent caterpillar defoliation in Schoolcraft, Delta, Dickinson and Gogebic counties, and to map pine tortoise scale injury in Schoolcraft County. In addition, the Lake States Forest Experiment Station surveyed for the red pine sawfly in the Cadillac Ranger District, Lower Michigan National Forest, and the pine tortoise scale in Delta County.

Control projects were carried out against the Saratoga spittlebug on the Ottawa and Upper Michigan National Forests and the European pine shoot moth on the Lower Michigan National Forest. There were no control projects on state land in 1955.

Jack pine budworm populations declined in the Upper and Lower Peninsulas.

Mortality of jack pine caused by the red-headed pine sawfly occurred in Leelanau County. Control operations on state land in this area will probably be initiated in 1956 following a survey to determine the expected population.

Larch sawfly defoliation occurred throughout the northwestern part of the Upper Peninsula with 75% of the needles destroyed in many places.

An increasing number of reports of white pine weevil injury on white, jack and red pine were received. Terminal killing of 40% or more of the leaders was reported in plantations in 13 counties in the northern Lower Peninsula.

Local outbreaks of the forest tent caterpillar continued in Schoolcraft and Delta counties and a new infestation was found in Gogebic County.

The European pine shoot moth continued to be the most serious threat to red pine plantations in the Lower Peninsula.

Spraying for the gypsy moth covered 12,500 acres in 1955. Trapping surveys in the sprayed area failed to uncover any moths. However, a few moths discovered outside of the sprayed area will necessitate a further control operation in 1956.

Eight new oak wilt locations were found, bringing the total known spots of infection to 166.

Dutch elm disease surveys have located 5,745 infected trees. This represents the first year in which there has not been at least a three-fold increase in the number of cases over the previous year.